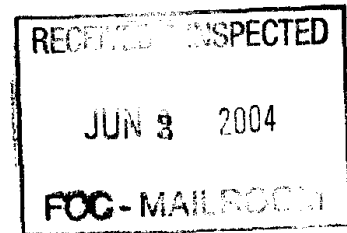


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Before the
Federal Communications Commission
Washington, DC 20554



In the Matter of

IP-Enabled Services

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WC Docket No. 04-36

COMMENTS OF AVAYA INC.

Chuck Crowders
Vice President, Government Affairs
AVAYA INC.
490 L'Enfant Plaza, S.W.
Suite 511
Washington D.C. 20024
(202) 378-2374
crowders@avaya.com

David L. Lawson
James P. Young
SIDLEY AUSTIN BROWN & WOOD LLP
1501 K St., N.W.
Washington, D.C. 20005
(202) 736-8000

Attorneys for Avaya, Inc.

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The development of IP-enabled voice services (or voice over Internet protocol, or “VoIP”), however, is now at a critical juncture. Enterprise customers are migrating to IP-enabled environments ever more rapidly, and mass market consumers are poised to begin migrating to VoIP services on a massive scale. As Commissioners have noted, this migration to

IP-enabled products and services promises to be “transformative” and “revolutionary,” because IP-enabled technologies promise to expand greatly the capabilities and features associated with plain old telephone service.

At present, however, IP-enabled products and services do not replicate completely consumer protections that are mandated with respect to traditional telephony to serve important public policy concerns – *e.g.*, access for individuals with disabilities, enhanced 911 services, and assistance to law enforcement. In this rulemaking proceeding, it is essential that the Commission take the steps necessary to ensure that these public policy concerns are appropriately accommodated in the transition to an IP-enabled environment. Avaya has long been a leader in devising solutions for carrying consumer protection functionalities over to IP-enabled networks, and Avaya’s leadership demonstrates that the Commission need not – and should not – sacrifice these concerns in the transition to IP-enabled voice services. Although flexibility will be required to ensure that appropriate technologies can be developed, tested and deployed in an orderly fashion and without deterring VoIP deployment or limiting its capabilities, the Commission should make clear that device manufacturers and service providers should strive for an IP-enabled “end game” that includes access for persons with disabilities, E911, and other valuable capabilities that consumers have come to expect. Indeed, given the expanded capabilities of IP-enabled VoIP services and devices, it is reasonable to expect that VoIP services will provide far greater public safety, disability access and other public interest benefits and capabilities than traditional telephony services and devices.

The Commission should also, to the greatest extent possible, rationalize federal regulation and preclude a patchwork of conflicting state regulations of IP-enabled services. The nomadic and flexible nature of VoIP services makes such services inherently “national.” A

federal regulatory regime that “speaks” with a single national “voice” should plainly be the preferred path to a nationwide system of rules, standards, and protocols that allows for seamless internetworking. At the same time, the Commission should recognize that regulating different forms of VoIP differently according to their means of delivery or whether they are “telephone” or “computer” services is unlikely to be productive. Rather, the Commission should generally insist that competing voice services be subject to the same regulations, including public policy obligations such as access for persons with disabilities and E911 in order to create a regulatory environment that encourages innovative IP-enabled services that will compete on the merits.

I. THE INDUSTRY SHOULD CONTINUE TO ACCOMMODATE IMPORTANT PUBLIC POLICY CONCERNS AS TECHNOLOGY CHANGES.

As consumers begin to migrate to IP-enabled services in a broad-based way, the Commission should ensure that important public policy concerns, such as access for persons with disabilities and E911, are not lost in the transition. Although establishing analogous mechanisms in an IP-enabled world will undoubtedly involve many technical and engineering challenges, Avaya’s leadership in designing new and innovative solutions to such problems demonstrates that these public policy benefits need not, and should not, be sacrificed in the transition to an IP-enabled environment.

Avaya is one of the world’s leading telecommunications equipment companies, and has been for more than 100 years – first as part of the Bell System and AT&T, then as part of Lucent, and now as an independent company. Avaya Labs is one of the successors to the legendary Bell Laboratories, and Avaya’s engineers and scientists have decades of experience in the telecommunications industry. Avaya holds or has applied for more than 1,600 patents, and the innovations of Avaya’s scientists have contributed much to today’s telecommunications network.

Over one million businesses worldwide, including 90% of the Fortune 500, use and rely on Avaya's equipment and services.

Avaya's principal focus today is on providing products and services that allow its customers to migrate from traditional telephony to IP-enabled telephony. Avaya has developed a broad array of market-leading IP telephony products that allow customers to create a "converged" network in which voice, data, video, and other applications traffic are all integrated into a single, unified network containing both wired and wireless elements. Avaya's flagship product for enterprises is its IP-enabled Communication Manager, which is voice application software that manages an enterprise's call processing, allows secure communications with customers across a variety of media, and supports many other applications. Avaya's media servers facilitate IP-enabled telephony on local area networks, and its media gateways allow traffic to be routed between traditional and IP-enabled telephony networks. Avaya also offers a broad range of support services (including network planning and design, network implementation, outsourced management, and maintenance), as well as appliances, including IP-enabled hardware and software (such as IP Softphone, which provides the functionality of a digital phone on a personal computer or handheld device). A recent study named Avaya as the worldwide market leader in Enterprise Internet Protocol Telephony Ports shipped in 2003.¹

Avaya follows a strict policy of striving to ensure that its products and telecommunications networks generally serve important social goals, such as access for individuals with disabilities and access to 911. Avaya's engineers invented many of the technologies that are widely used today for access for persons with disabilities – technologies

¹ Synergy Research Group's Q4 2003 Enterprise Telephony Market Shares, Synergy Research Group, Inc.

which, wherever possible, are simply embedded in existing products at no extra cost. Avaya is currently developing a number of new mechanisms, using technology already embedded within its systems, that will maintain and even improve access for persons with disabilities in an IP-enabled environment. These VoIP technologies promise many exciting opportunities for improved access for persons with disabilities that will allow increased work-at-home options and much more.

Although Avaya offers products for every segment of the market, Avaya's leadership in the enterprise market is significant, because enterprise customers tend to have a greater range of demands, which often leads to the development of cutting edge products that subsequently become standard features for mass market customers. A good example is 911 capabilities. Avaya's enterprise customers have placed significant emphasis on the ability to maintain 911/E911 capabilities in an IP-enabled environment, and Public Safety Answering Points ("PSAPs") are also in some cases Avaya customers. As a result, Avaya is working hard to develop measures that will allow continued access to 911 and that will ultimately benefit the entire industry. Enterprise customers have also been very sensitive to Internet-based networks' greater vulnerability to deceptive and malicious communications, security breaches and invasions of privacy. In response to these concerns, Avaya has developed a set of market-leading customer protection measures that, again, can benefit the entire market.

The important social policies the Commission has always furthered in the context of traditional telephony can and should be retained in the context of VoIP. The development of IP-enabled services is now at a critical juncture; as the Commission itself acknowledges, the migration to IP-enabled services is about to accelerate and become "revolutionary." *Notice ¶¶ 3-5*. Although the Commission has taken a hands-off approach to regulating VoIP until now, the

Commission can no longer afford to stay silent with respect to these key functionalities of the telecommunications network upon which we all depend. Indeed, with appropriate leadership from the Commission, the increased capabilities and flexibility of VoIP technologies hold the promise that many of these concerns can be accommodated much more effectively, and that IP-enabled networks can provide even greater benefits than was possible with traditional telephony networks.

Accordingly, the Commission should look with great skepticism at any claim that these public interest concerns cannot be accommodated for VoIP services. To be sure, it may not be appropriate to mandate immediate compliance with certain existing consumer protection and public interest regulations, where, for example, cost effective and readily achievable technological solutions are in sight but not yet a reality, and therefore the Commission may need to allow for reasonable implementation and transition periods. Nonetheless, as detailed below, the Commission must take a leadership role to ensure that companies stay focused, as Avaya is, on designing appropriate solutions that will bring enterprise and mass market consumers both IP-enabled innovations and the public safety and other protections they have come to expect.

Finally, the Commission should also make clear that these public policy measures, to the maximum extent possible, should be available at no extra cost to the consumer. The public has come to expect many of these functionalities to be standard features of voice service that do not require extra fees or extraordinary expense, and the Commission should make clear that providers of IP-enabled services should continue to meet those expectations wherever possible. Otherwise, the transition to IP-enabled services may leave people behind and deny them the continued benefit of the public policy measures that we have all taken for granted in the traditional telephony network.

II. THE COMMISSION SHOULD TAKE APPROPRIATE STEPS TO MINIMIZE STATE REGULATION, AND TO HARMONIZE FEDERAL REGULATION, OF VOIP SERVICES.

The *Notice* seeks comment on various issues related to how VoIP services should be classified for regulatory purposes. Avaya takes no position on the regulatory classification of particular VoIP services or what economic regulations, if any, should apply to those services. Regardless of how services are classified, however, the Commission should, to the maximum extent possible consistent with the Act and public interest concerns, ensure that VoIP services are regulated, where appropriate, at the federal level, and are not subject to a patchwork of potentially conflicting and investment-retarding state regulations and that regulations are technology, platform and service provider neutral so that consumers and market forces, and not regulators, determine the “winners” and “losers.”

Federal v. State Regulation. The Commission should assert federal jurisdiction over many aspects of VoIP services. In particular, it should take the lead in establishing the public policy regulatory mandates for VOIP services.

The inherently nomadic nature of VoIP services makes federal regulation not only appropriate but necessary. VoIP end users typically can take their IP phones with them anywhere and make calls, using their own personal VoIP service, wherever they can find a broadband connection. For this reason, manufacturers and service providers must have systems and products capable of interacting with network facilities anywhere in the country, and with a wide array of media (*e.g.*, cable, wireless, etc.). If fifty state commissions were to begin imposing inconsistent mandates, the cost of complying with such mandates could increase exponentially, and indeed, could effectively thwart the federal policies altogether. The FCC

should, accordingly, establish uniform, national policies that appropriately accommodate legitimate public policy concerns.

E911 provides a useful example of why federal regulation, and not a patchwork of potentially conflicting state regulations, is appropriate. In traditional wireline telephony, all end-users are tied to a specific geographic location, and therefore all end-users are paired with a single PSAP in their immediate area. In such an environment, the 911 system can still function even if PSAPs and their local LECs have established a wide variety of arrangements, and operate under different sets of rules in different areas of the nation. By contrast, in an IP-enabled environment, where devices and services are nomadic and can be used anywhere, service providers must be able physically to deliver 911 calls to potentially any PSAP in the nation. Such a system can work efficiently only if equipment manufacturers, service providers, and PSAPs are working from uniform standards, protocols and regulatory requirements. If states begin to impose their own additional 911 requirements, every service provider and manufacturer in the nation could be required to design their products and services to accommodate a bewildering array of conflicting requirements – which would increase costs, harm efficiency, and could, indeed, defeat the entire enterprise.

In addition, states often have little experience in regulating IP-enabled services, and they also face limited resources for analyzing the technical aspects of such services. As a result, states can often adopt regulations that, even if well intended, actually impose counterproductive or unachievable requirements. For example, Florida Statute § 365.175 requires enterprise networks to display information at the PSAP. That is impractical, if not physically impossible; with current technology, an enterprise network can, at best, forward information to the central

office. The central office must transport that information to the PSAP, which then displays it on its own equipment.

VoIP offerings typically encompass a substantial percentage of interstate traffic, and are at a minimum jurisdictionally mixed. It is well-settled that the Commission may preempt state regulation of jurisdictionally mixed services if state regulation would “negate[] the exercise by the FCC” of its lawful powers. *National Ass’n of Regulatory Util. Comm’rs v. FCC*, 880 F.2d 422, 428-29 (D.C. Cir. 1989) (“NARUC”); see also, e.g., *Louisiana PSC v. FCC*, 476 U.S. 355, 360 (1986); *California v. FCC*, 39 F.3d 919, 931-32 (9th Cir. 1994) (“*California II*”); *California v. FCC*, 905 F.2d 1217, 1241-43 (9th Cir. 1990) (“*California I*”); *North Carolina Utils. Comm’n v. FCC*, 552 F.2d 1036, 1043 (4th Cir. 1977). The Commission unquestionably has jurisdiction to establish a federal policy to promote the development of VoIP and to require the implementation of these public policy measures for VoIP, and it could find that many types of state regulations in these areas would impose substantial costs and inefficiencies that would negate that federal policy.

Competitive Neutrality. Equally important, the FCC should strive to make the regulatory treatment of VoIP consistent across technologies. VoIP represents the convergence of many different types of services that previously fell into various regulatory “boxes,” with different regulatory obligations and burdens. It is critically important that the Commission recognize that these regulatory distinctions are unlikely to have any real-world meaning in an IP-enabled environment, and that the Commission must therefore harmonize regulation in order to maintain competitive neutrality. The Commission should make clear that it will remain vigilant to ensure that no provider at any level of the value chain – from applications owner to access facility owner – can dominate VoIP markets.

Going forward, the Commission should recognize that a call is a call and that all competing voice services generally should be treated the same. The Commission has previously attempted to identify various categories of telephony – traditional telephony, phone-to-phone VoIP services, computer-to-phone VoIP, and computer-to-computer VoIP. None of these distinctions, however, can ultimately be sustained as a practical matter in an IP-enabled world. Past distinctions between “computers” and “telephones” have little or no meaning with respect to today’s appliances, which almost without exception embody “computer” technology to provide consumers with powerful new features and functionalities. Indeed, the great promise of IP-enabled services is their ability to meld voice and data communications into a single, more comprehensive and feature-rich offering. For the first time, VoIP brings “telephone” and “computer” companies into the same market to compete with each other, and the Commission generally should apply the same regulations to all providers of IP-enabled voice services.

Competitive neutrality counsels in favor of applying public policy regulations consistently, regardless of historic regulatory classifications and whether a provider is a “telephone” or “computer” provider. If fewer rules and mandates were to be imposed on some forms of VoIP (*e.g.*, computer-to-computer VOIP services) than other forms of VoIP services with which they compete, the favored services could receive an artificial, and unwarranted, competitive advantage in the marketplace. Moreover, if fewer mandates are placed on some modes of VoIP, that differential treatment would promote the favored services at the cost of the important public policy concerns that should be required for all VOIP services – indeed, such differential treatment would create powerful incentives to move to services where these public policy concerns are not accommodated. The Commission has a unique opportunity to ensure

appropriate uniformity in the treatment of VoIP services now while VoIP is still in its infancy; it should not squander that opportunity.

Competitive neutrality at the applications and service level may, for example, require certain nationwide standards and protocols for IP-enabled services, because of the intensively interlinked nature of an IP-enabled environment. For example, E911 in an IP-enabled environment will require technology that allows a device to communicate its geographic location to any other point in the nationwide network and to any other service provider, regardless of medium. In the absence of nationwide standards and protocols, different companies would develop different methods for signaling that information. This would not only decrease the efficiency and effectiveness of public policy initiatives like E911, it would harm competition, because varying standards and protocols would prevent customers from using multiple vendors to serve their needs.

Market Power Concerns. In this new world of IP-enabled services, the critical distinction is not between different flavors of VoIP services and devices, but network facilities and the devices and services that connect to and ride on those facilities. In this regard, the Commission should keep a sharp eye on the development and operation of broadband network facilities and intervene where necessary to discourage anticompetitive conduct that could impede the ability of diverse device manufacturers and service and applications providers to serve consumers in a nondiscriminatory environment. Where market power persists, regulation at the network level may be necessary to ensure that all service providers can offer IP-enabled services and devices on a level playing field. Indeed, the Commission should stress the importance of “openness” and nondiscrimination at all levels of the value chain, and should remain vigilant to

address any market power concerns that may pose a significant threat to VoIP deployment and competition.

III. PUBLIC SAFETY, ACCESS FOR PERSONS WITH DISABILITIES AND OTHER CORE PUBLIC POLICY CONCERNS MUST NOT BE DISREGARDED IN THE VOIP CONTEXT.

The Commission should generally apply key public policy regulations – *e.g.*, access for persons with disabilities and 911/E911 – to VoIP services. These public policy measures have provided enormous benefits to the public, and most telephone users have come to expect that these important mechanisms will be simply part and parcel of voice telephone service. Although appropriate transitions will be necessary in some cases before these concerns can be fully accommodated, these public policy benefits must not be lost in the transition to IP-enabled services. Indeed, IP-enabled technology promises to provide a much more effective means of achieving these public policy goals, which is ultimately likely to be one of the principal benefits of the shift to IP-enabled services.

We focus below on two public policy concerns in particular – access for persons with disabilities and 911/E911. We also highlight another public policy concern that has not received as much attention – the need for increased protections for customers against deceptive and malicious calling practices on IP-enabled networks.

A. Disability Access

Pursuant to § 255 of the Act (47 U.S.C. § 255), the Commission currently requires manufacturers and telecommunications carriers to implement “readily achievable” measures to provide access to individuals with disabilities. Avaya has a long tradition of inventing and designing products that permit improved access for persons with disabilities, and it has been

designing new and innovative ways to use existing technology to make VoIP services more accessible to persons with disabilities. Marketplace forces alone, however, may not be enough to ensure that manufacturers and service providers will look for and implement “readily achievable” measures to make VoIP services more accessible. To ensure that the entire industry remains committed to designing and implementing such measures, the Commission should – with appropriate recognition of the “readily achievable” standard and the need for transitions to an IP-enabled environment – extend its existing accessibility rules to VoIP services.

The technology of VoIP is considerably different from traditional telephony, and therefore adapting existing accessibility devices for use with VoIP services presents engineering challenges that are significant, but not insurmountable. In traditional telephony, all transmissions – including voice, touch-tones, and modem signals – are carried on a single audio channel. Many traditional assistive technologies – notably TTYs – rely on the telephone system’s ability to transmit audio information reliably and without distortion.

By contrast, VoIP audio channels at present cannot support reliable TTY communication, because VoIP providers use a method of voice-optimized audio compression that can decrease TTY accuracy to the point where it becomes unusable. Avaya, however, has found a solution to this problem. VoIP technology allows non-audio information to be transmitted via parallel data channels, even while a call is in progress. Avaya is already using this capability to provide reliable transport of Baudot TTY signals on VoIP wide area networks. Rather than transmit the TTY tones via the voice channel in a VoIP telephone call, a description of the tones is sent via a parallel data channel, with a command to the receiving device to reconstruct the original audio tones for the TTY device at the other end. This is a creative solution that works quite well.

This solution brings VoIP systems up to parity with traditional telephone systems. But Avaya is doing much more, because the relative flexibility of VoIP technology allows for far greater possibilities. For example, Avaya has a software adjunct for its IP telephones, called Universal Access Phone Status, that Avaya provides for free. It takes advantage of capabilities that are present in our IP telephones, but not available in traditional phones, to provide by voice output all of the information that is presented visually to sighted users – such as which lines are available and which are in use, whether the phone is forwarded, whether there is new voicemail, and whether someone on hold has disconnected.

The existing § 255 standard requires manufacturers and service providers to implement only those accessibility measures that are “readily achievable.” *See* 47 U.S.C. § 255(b), (c). A major component of the Commission’s “readily achievable” test is whether the mechanism can be deployed with little additional expense.² Many of Avaya’s solutions for persons with disabilities (including the ones described above) are provided for free – with no additional charges or fees – because all of these solutions make use of capabilities that already existed in Avaya’s systems. For example, our TTY-on-VoIP solution uses a mechanism that was implemented originally to transmit touch-tones. Our TTY messaging uses software that was written originally to support multi-lingual *spoken* announcement sets. This style of engineering, in which Avaya tries to “piggy back” onto existing capabilities, is a hallmark of our approach and provides real, “achievable” benefits. Of course, it is not always possible to include accessibility mechanisms within a standard product for no additional charge, but Avaya always tries to do so.

² *See Implementation of Sections 255 and 251(a)(2) of the Communications Act of 1934, as Enacted by the Telecommunications Act of 1996*, WT Docket No. 96-198, Report and Order and

To ensure that all manufacturers and service providers are focused on accessibility solutions, however, the Commission should take additional steps that recognize that market forces alone will not always be sufficient to safeguard the interests of individuals with disabilities, for several reasons. First, each individual disability population represents only a small portion of the market, and therefore these populations often cannot generate the necessary consumer demand to induce manufacturers to expend the resources to develop accessible technology. This is exacerbated by the fact that individuals with disabilities on average earn lower incomes, which further reduces their power in the marketplace. Many individuals with disabilities simply cannot afford expensive adaptive equipment. Thus, absent government leadership, there can be a lack of attention by the people without disabilities when designing, purchasing, and installing information technology. As a result, people with disabilities have historically often been denied access to new technologies that enter the competitive marketplace.³

VoIP has the potential to replace or greatly supplement the functionality of traditional telephone services. For example, as IP phones become more advanced, manufacturers will be

Further Notice of Inquiry, ¶¶ 43-70 (1999).

³ This is dramatically illustrated by the general reaction to Avaya's mechanisms for accessibility to its voicemail products. In 1993, Avaya implemented a TTY user interface for its Intuity™ AUDIX® voicemail system. A key feature of this system, beyond its ability to do simple TTY messaging, is that callers may select whether they wish to be prompted in voice or TTY format. This feature is significant, because it allows the company receiving the voicemails to give the same phone number to both voice and TTY callers. Regardless of the prompting format that is selected, callers may leave voice or TTY messages. The vast majority of private companies that use Avaya's voicemail system, however, do not activate the TTY feature. This is true even though Avaya provides the Intuity TTY interface for free. It is not an add-on, but is instead installed on our systems at the factory. There is no license fee or right-to-use fee. The only thing a system administrator needs to do is turn it on. Avaya's Intuity product literature even highlights this feature. But system administrators often do not turn the feature on, and as a result, callers using TTY devices may be unable to leave a voice mail message through TTY

able to convey a tremendous amount of information to the end user through on-phone display screens or through other visual cues such as lighting (e.g., time, date, caller ID information, presence of new voice mail, “Send all calls” forwarding, identifying which lines are available, identifying which lines are on hold, identifying whether a caller on hold has been dropped). However, for a blind or visually impaired user, such advances could instead be set-backs, unless the same information is conveyed through audible methods. The Commission should, accordingly, bring VoIP manufacturers and providers within the § 255 framework – with appropriate recognition of the “readily achievable” standard and the need for an orderly and investment-friendly transition to an IP-enabled environment. In this way, the Commission will encourage manufacturers and providers continually to consider whether there are “readily achievable” means to make these and other features accessible to individuals with disabilities.

B. E911

The Commission should also take steps to ensure that the industry works expeditiously toward full 911 and enhanced 911 capabilities for VoIP services. The ability to maintain access to 911 is a key challenge as customers increasingly migrate to mobile IP-enabled services. 911 capabilities provide enormous public benefits, and the Commission should act to make sure that this critical aspect of the telecommunications network is not only retained, but strengthened, as IP-enabled services become widespread.

Making this transition, however, will require a substantial, industrywide effort that will likely take years. Manufacturers alone cannot establish the conditions for VoIP 911/E911. There must be sustained coordination between this Commission, manufacturers, service

tones, and instead, must call a relay service.

providers, and, perhaps most importantly, PSAPs. Moreover, a single set of nationwide standards and protocols, adhered to by all PSAPs, manufacturers, and providers, will be critical for many aspects of VoIP 911/E911; otherwise, a hodgepodge of standards will develop that will both radically increase the costs of coordinating with PSAPs on a nationwide basis, and harm competition for IP-enabled services, because customers will be unable to use multiple vendors in their networks.

Avaya has extensive experience with its enterprise customers in attempting to maintain access to 911 in a IP-enabled environment. In important respects, full basic 911 functionality and enhanced 911 functionality simply are not feasible today. Although Avaya's experience is primarily with enterprise customers, the transition for mass market customers to IP-enabled E911 raises many of the same issues and Avaya's experience is instructive. With respect to basic 911 service in an IP-enabled enterprise environment, there are two fundamental technical issues: (1) whether the enterprise network can find the geographic location of the caller, and (2) if so, whether the enterprise network can route the call to the nearest PSAP.

IP-enabled networks, as currently designed, sometimes cannot determine the physical location of a caller. For calls on a private wide area network ("WAN"), it is possible (but difficult) to locate the caller, but the system must obtain information from the IP network in order to find the phone. To do so, there must be design changes in either the system or the network equipment, or both. In the absence of industry standards, different manufacturers will design different ways of signaling this information, which would negatively impact competition because that would make it difficult for one enterprise to use equipment from multiple vendors in the same network.

For an enterprise system in which IP phones access the system remotely from a modem or through a VPN tunnel through the Internet, locating the caller would be very difficult today. The network connection from the phone to the IP-enabled system is not under the control of the enterprise. The only way to obtain location information would be for either the phone user or the phone itself to provide the location information to the system. Solving this problem will require even broader coordination between phone manufacturers, IP-enabled system manufacturers and data network equipment manufacturers, and, again, will require a single, industrywide standard to facilitate competition among multiple vendors.⁴

Even if the enterprise network could identify where the caller is, the IP-enabled network may not be able to route the call to the PSAP. For example, in the context of a WAN, the IP-enabled network could route the call to the appropriate PSAP only if the system happens to have a PSTN trunk near the IP caller. This is because 911 calls today must enter the PSTN near the correct PSAP; neither wireline LECs nor PSAPs have any ability today to forward calls to a distant PSAP if a nomadic IP-enabled user misdirects a 911 call. One possible solution would be to require the LECs to accept a 911 call including an area code, and route it to the appropriate PSAP.⁵

⁴ In addition, different types of connections could lead to different levels of accuracy about location information. For example, in the context of a WAN, if location information is derived from the IP address, the information will only be as accurate as an IP subnet is large. IP subnets can span multiple buildings in a campus. If the IP caller is using WiFi or another wireless IP network, location information is only as accurate as the in-building wireless detection algorithms. The more complex the algorithm and the more antennas installed in the enterprise, the more accurate the location information. But this adds cost; industrywide standards are also necessary, to facilitate internetworking and competition. If location information is obtained from the routers or other data network equipment, the location information could potentially be as accurate as for circuit switched phones.

⁵ For example, suppose a PBX in Denver, Colorado, is providing service to an IP Telephone, and

The same problem arises for an IP phone connected to the private network via modem or VPN, but the technical obstacles are exponentially greater. An enterprise's WAN usually covers a manageable number of locations, but an IP phone connected by modem or VPN could be anywhere. Moreover, any solution that focuses on the enterprise network will be inherently burdensome and inferior. For example, while an IP phone could perhaps send GPS coordinates to the network, the network would have to maintain conversion tables to convert those GPS coordinates into an area code for any possible U.S. location, which would be extremely impractical to maintain. Again, the best solution may be to give PSAPs the ability to transfer calls to the correct area code if a 911 call happens to terminate to the wrong area code.

All of this underscores the central role the PSAPs must play in the transition to IP-enabled 911 services. If every PSAP in the United States were equipped with IP interfaces capable of accepting IP 911 calls, then 911 calls originated on IP-enabled phones and networks could be reliably directed to the appropriate PSAP. This is another instance, however, in which a single industry standard is critically important. If different PSAPs choose to implement different VoIP protocols, carriers and enterprise network owners would have an insupportable burden keeping track of which PSAPs could accept VoIP calls at all, and of those that could, which PSAPs used which protocols. Accordingly, any IP-based solution must be based on nationwide implementation of a minimal set of well-defined VoIP protocols.⁶

the IP Telephone happens to be physically in Washington, D.C. The PBX in Denver could complete the 911 correctly if it were able to send the digit string "1-202-911" to the Denver CO and the LEC were required to forward the call to the PSAP in Washington rather than the PSAP in Denver.

⁶ Also, any mechanism for carrying 911 information or calls over IP-enabled networks must be protected against unauthorized monitoring, prank calls with spoofed originator information, and denial of service attacks. There should be a nationwide implementation of security protocols for

Enhanced 911 capabilities are generally not feasible in IP-enabled networks today when the end-user is taking advantage of the nomadic capabilities of IP-enabled phones. Making IP-enabled E911 a reality for all possible situations will require the Commission to work with the industry to overcome a number of additional challenges. For example, if an end-user has moved her phone to a location other than her primary location, an IP-enabled enterprise network today cannot deliver *both* callback and location information to a PSAP, and manufacturers alone cannot change that fact. This is because central offices and PSAPs are currently set up to receive only one phone number. The network sends the central office the phone number; the central office forwards the phone number to the PSAP; and equipment at the PSAP looks up the location from a database, using the one phone number as an index. If a person dialing 911 had an IP telephone, and had just moved the phone from one LAN jack to another jack, the location information for that phone would not yet be updated in the ALI database. Because the enterprise network can send only one phone number to the central office, that phone number could be either the one associated with the caller's new location in the ALI database, or it could be the caller's phone number, usable for call back – but it cannot be both.

The ANSI T1.628-2000 ISDN network interface standard does provide a means for signaling callback and location as two separate information items. If the Commission were to adopt the ANSI T1.628-2000 ISDN network interface standard as an “accepted industry standard,” LECs could be required to allow enterprise networks to signal callback and location separately.

all devices that could place or receive a VoIP 911 call. *See* Section III.C., *infra*.

Ultimately, however, the Commission should require the more comprehensive solution of defining an IP protocol that IP-enabled networks could use to update the ALI database, or for signaling location information over IP directly to the PSAP, perhaps during a 911 call. This would require PSAPs to update their own equipment, and it would be critically important for all PSAPs to adhere to a single, nationwide ALI database update protocol, as well as security protocols to protect against unauthorized monitoring, unauthorized access, and denial of service attacks. A single nationwide standard is necessary to maximize efficiency and to avoid the need for carriers and networks to maintain information as to which PSAPs accept which protocols.

In short, the Commission should require access to 911 and E911 for IP-enabled voice services, but it must recognize that a transition will be necessary. If the Commission establishes clear goals and a reasonable timeframe for development and implementation, manufacturers can work towards those goals and, given enough flexibility, can design the equipment necessary to make the transition to IP-enabled 911. The Commission should also work with the industry to develop nationwide standards and protocols, and it should when appropriate preempt state efforts to establish additional or contrary standards for manufacturers, providers, or PSAPs that would have the effect of negating federal policy.

C. End User Security and Protection

Finally, the Commission should also consider new protections for end-users in an IP-enabled environment. Compared with traditional telephony, IP network services are more loosely defined and much more susceptible to spoofing, masquerading, pretending, searching, stalking, and spying. New rules are needed to ensure that IP-enabled voice networks are secure, that identity is verifiable, and that privacy is guaranteed. Features that ensure such privacy

should be embedded in the network and simply expected as a part of IP-enabled voice service, and should not require extra effort on the part of individuals and communities.

Avaya has developed a number of features that protect end-users from deceptive and malicious IP communications, keep IP-enabled networks secure, and protect consumers against the VoIP equivalent of “junk” email. For example, Avaya’s enterprise systems include registration mechanisms that ensure that the network can recognize authorized users and that no one can deceptively assume the identity of any of the network’s users. Avaya’s IP-enabled systems also allow an end-user to signal that she is receiving a malicious call, without the malicious caller knowing; upon receiving the signal, the enterprise network to record the call and capture other information that can help trace the call. And Avaya has also developed a Crisis Alert feature that alerts a system manager to the existence of a 911 call, and that allows the system manager to continue the 911 call on the user’s behalf and separately alert emergency responders or other assistance. The Commission should make clear that consumers have a right to expect that VoIP services offer security and privacy that is at least comparable to that of the traditional telephony network.

CONCLUSION

The Commission should adopt rules to govern IP-enabled services that:

- (1) ensure competitive neutrality and consistent regulatory treatment for all VoIP calls across all technologies, whether “telephone” or “computer”;
- (2) establish a federal regulatory regime that avoids a 50-state patchwork of inconsistent regulations;

(3) with appropriate transitions and recognition of the “readily achievable” standard, require access for individuals with disabilities;

(4) require 911 and E911 functionalities, based on national standards and protocols, with a reasonable transition, and

(5) consider appropriate consumer protections for security and privacy.

Respectfully submitted,

Chuck Crowders
Vice President, Government Affairs
AVAYA INC.
490 L’Enfant Plaza, S.W.
Suite 511
Washington D.C. 20024
(202) 378-2374
crowders@avaya.com

/s/ James P. Young
David L. Lawson
James P. Young
SIDLEY AUSTIN BROWN & WOOD LLP
1501 K St., N.W.
Washington, D.C. 20005
(202) 736-8000

Attorneys for Avaya Inc.

May 28, 2004

CERTIFICATE OF SERVICE

I hereby certify that on this 28th day of May, 2004, I caused true and correct copies of the forgoing Comments of Avaya, Inc. to be served on all parties by mailing, postage prepaid to their addresses listed on the attached service list.

Dated: May 28, 2004
Washington, D.C.

/s/ James P. Young

James P. Young

SERVICE LIST

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Room CY-B402
Washington, D.C. 20554⁷

Qualex International
Portals II
445 12th Street, SW, Room CY-B402
Washington, D.C. 20554

Janice Myles (2 copies)
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

⁷ Filed electronically via ECFS